Gopher Tortoise Studies at Ft. Benning

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Gopher Tortoises

- State reptile of GA
- Species of special concern in FL
- Keystone species in their environment
- Threatened in western part of range (west of Mobile and Tombigbee Rivers in AL) mainly due to development

2 Gopher Tortoise Studies

- Relocation
- Burrow Collapse

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Relocation Study

- Relocation is common conservation practice used to protect tortoises from developers who infringe on their habitat

- Relocation of tortoises at Ft. Benning is necessary for development of DMPRC area

What are the physiological effects of relocation on the gopher tortoises?

- Stress
- Immunocompetence

Treatment Groups

Treatment Groups

Source Sites

Impacted Habitat

F01

D1 4

Treatment Groups

Source Sites

Impacted Habitat

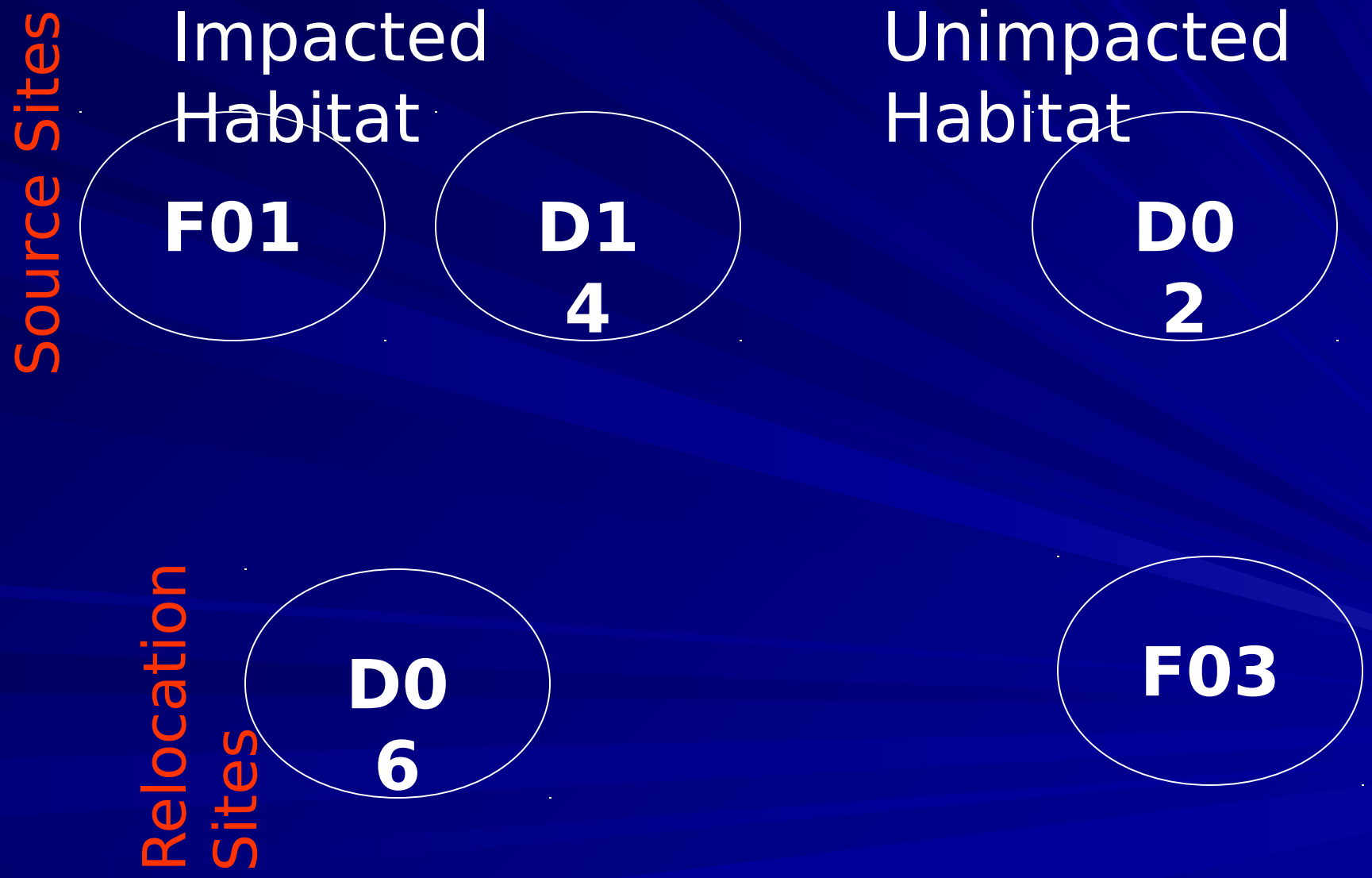
F01

D14

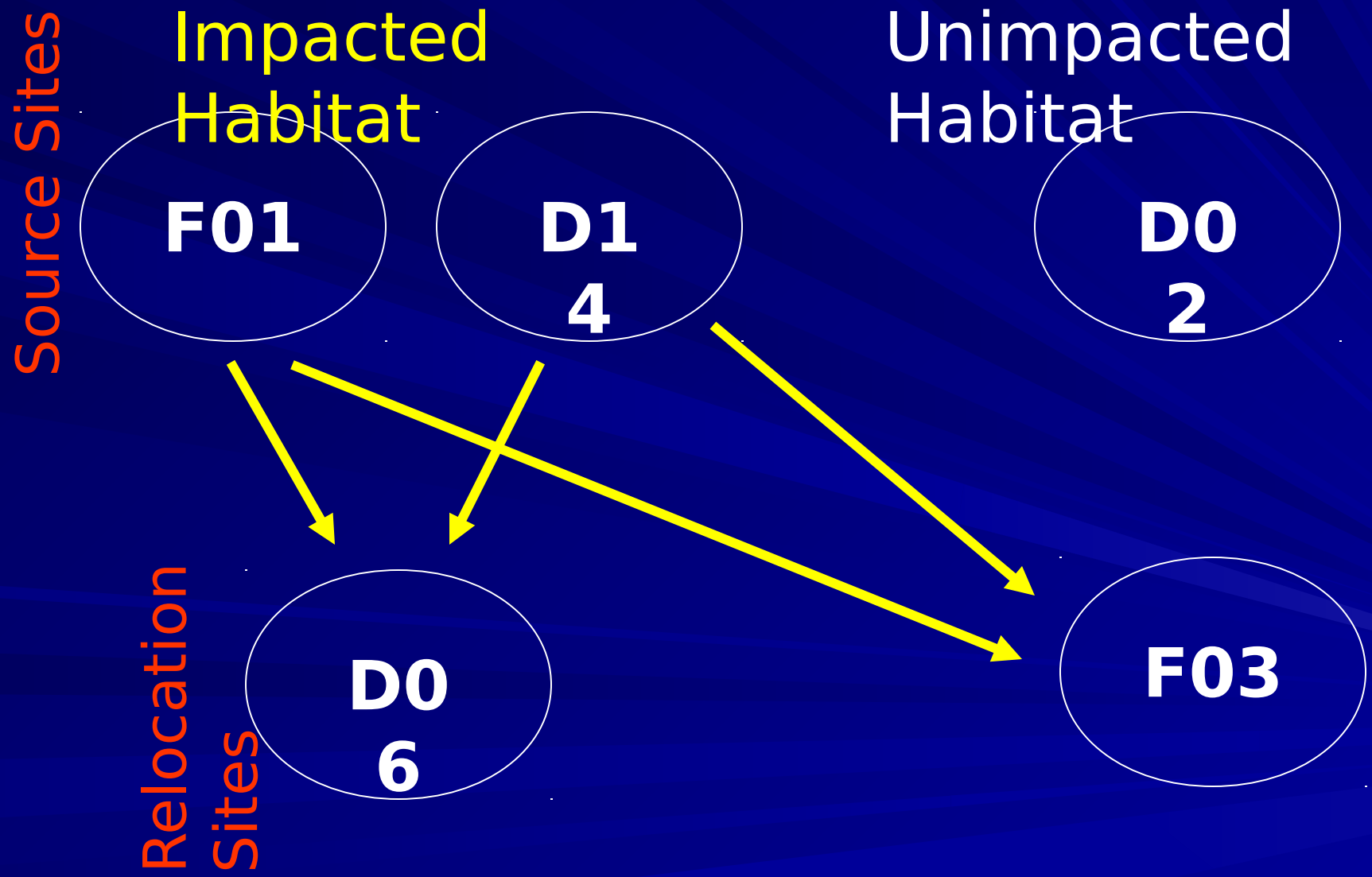
Unimpacted Habitat

D02

Treatment Groups



Treatment Groups



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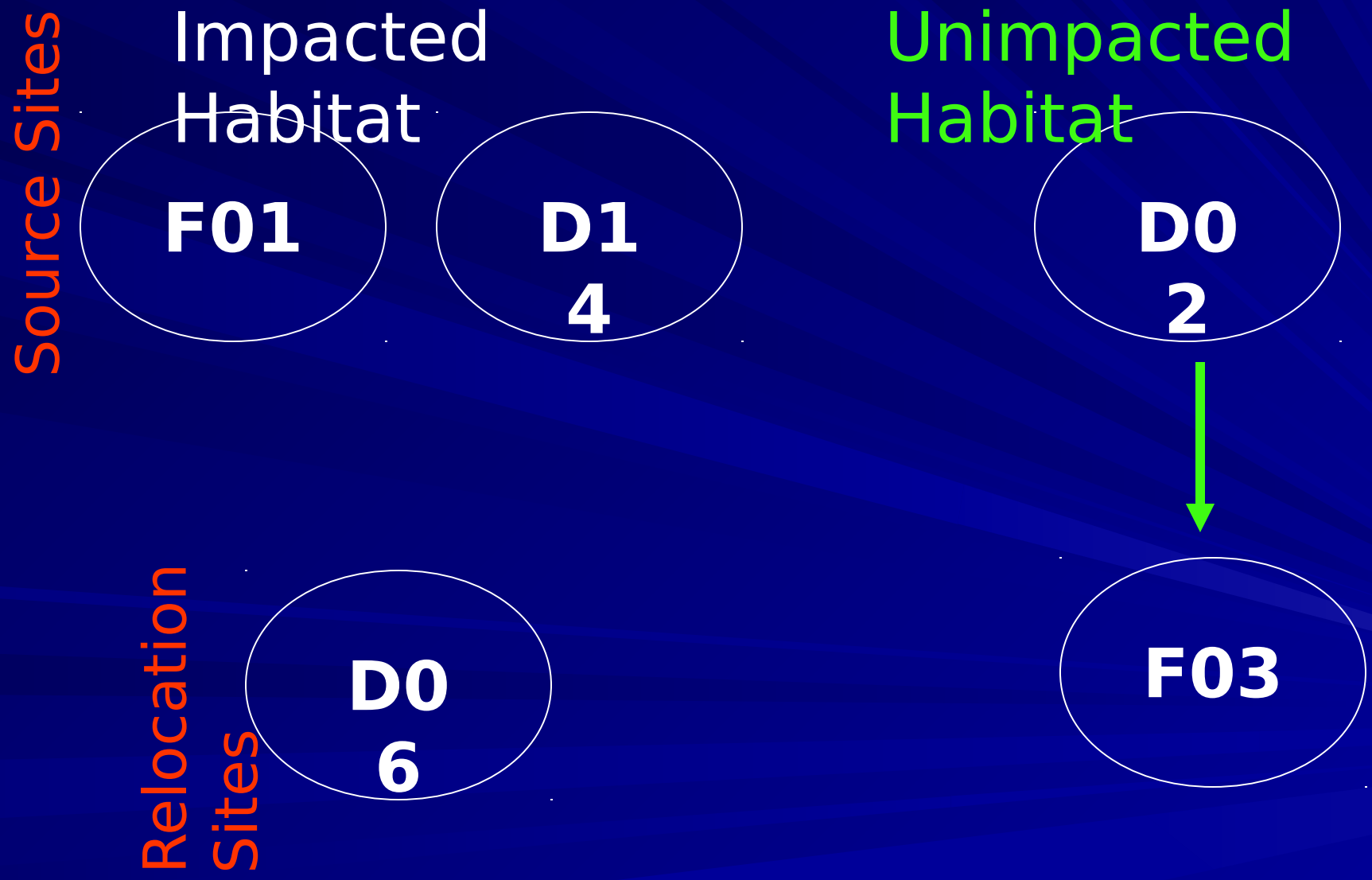

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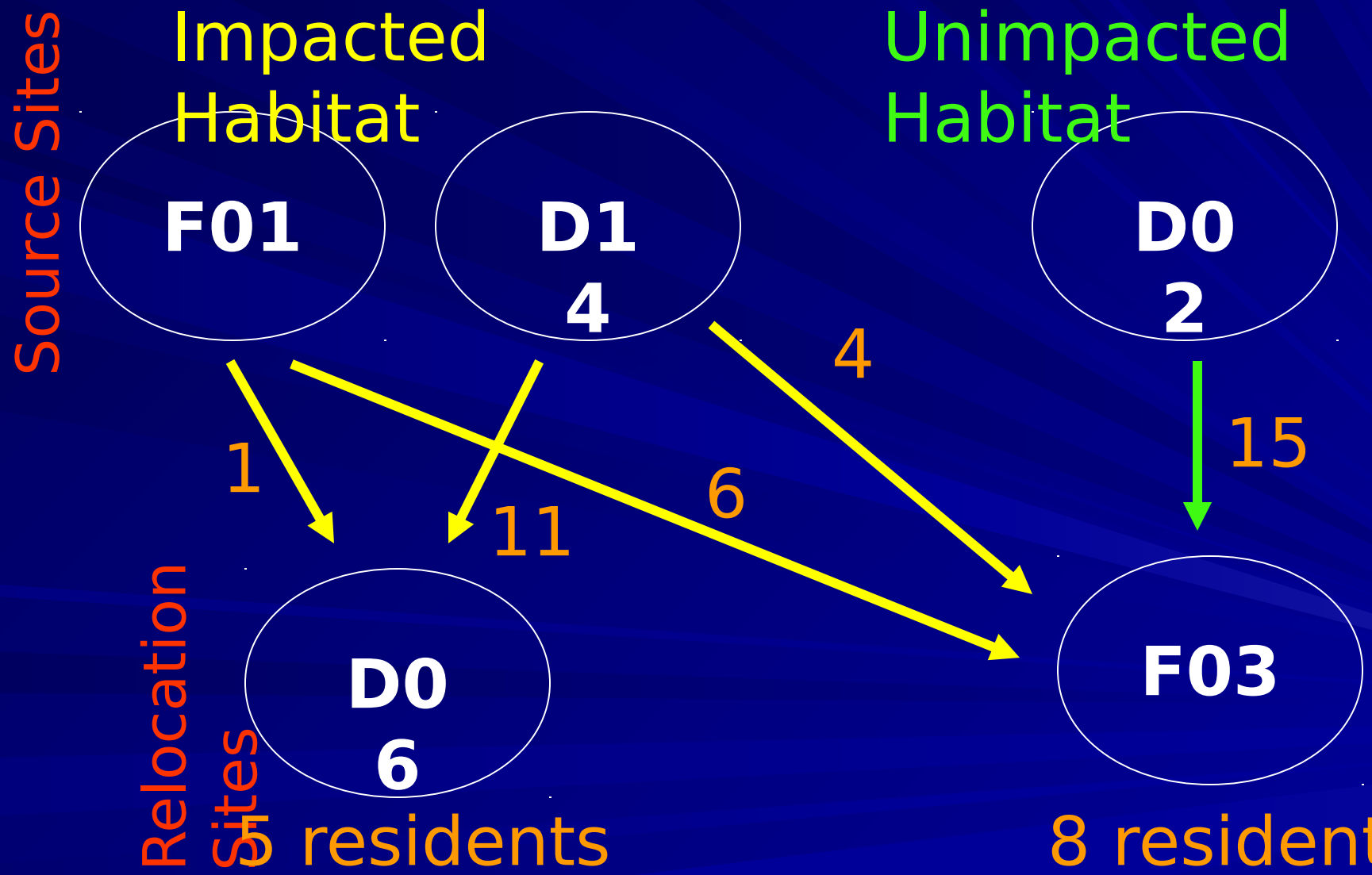

Pens – Digging the Trenches

F3

D6

Do trenchers get flat tires?

Completed Pens

F3

D6

What are the physiological effects of relocation on gopher tortoises?

Physiological Condition	Biomarker	Assessment Tool
Stress	Corticosterone	ACTH Challenge

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ACTH = adrenocorticotropin hormone

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No corticosterone = STRESSED OUT

Physiological Condition	Biomarker	Assessment Tool
Stress	Corticosterone	ACTH Challenge
Immunocompetence	T cells (swelling)	PHA Challenge

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PHA = phytohemagglutinin (kidney beans)

Physiological Condition	Biomarker	Assessment Tool
Stress	Corticosterone	ACTH Challenge
Immunocompetence	T cells (swelling)	PHA Challenge
	B cells (antibodies in blood)	SRBC Challenge

SRBC = sheep red blood cells

Other Immune Measures

- Differential White Blood Cell Count
- Hematocrit
- Health Profile

Stress and Immune Challenge Timeline

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Day 0 Capture bleed

Stress and Immune Challenge Timeline

Day 0 — Capture bleed

At Base — Pre-Measure PHA, Inject ACTH, SRBC, and PHA

Stress and Immune Challenge Timeline

Day 0	→	Capture bleed
At Base SRBC,	→	Pre-Measure PHA, Inject ACTH, and PHA
+4 hours	→	ACTH bleed

Stress and Immune Challenge Timeline

Day 0	→	Capture bleed
At Base SRBC,	→	Pre-Measure PHA, Inject ACTH, and PHA
+4 hours	→	ACTH bleed
+12 hours	→	PHA measure

28
28
28

Stress and Immune Challenge Timeline

Day 0 → **Capture bleed**

At Base → **Pre-Measure PHA, Inject ACTH, SRBC, and PHA**

+4 hours → **ACTH bleed**

+12 hours → **PHA measure**

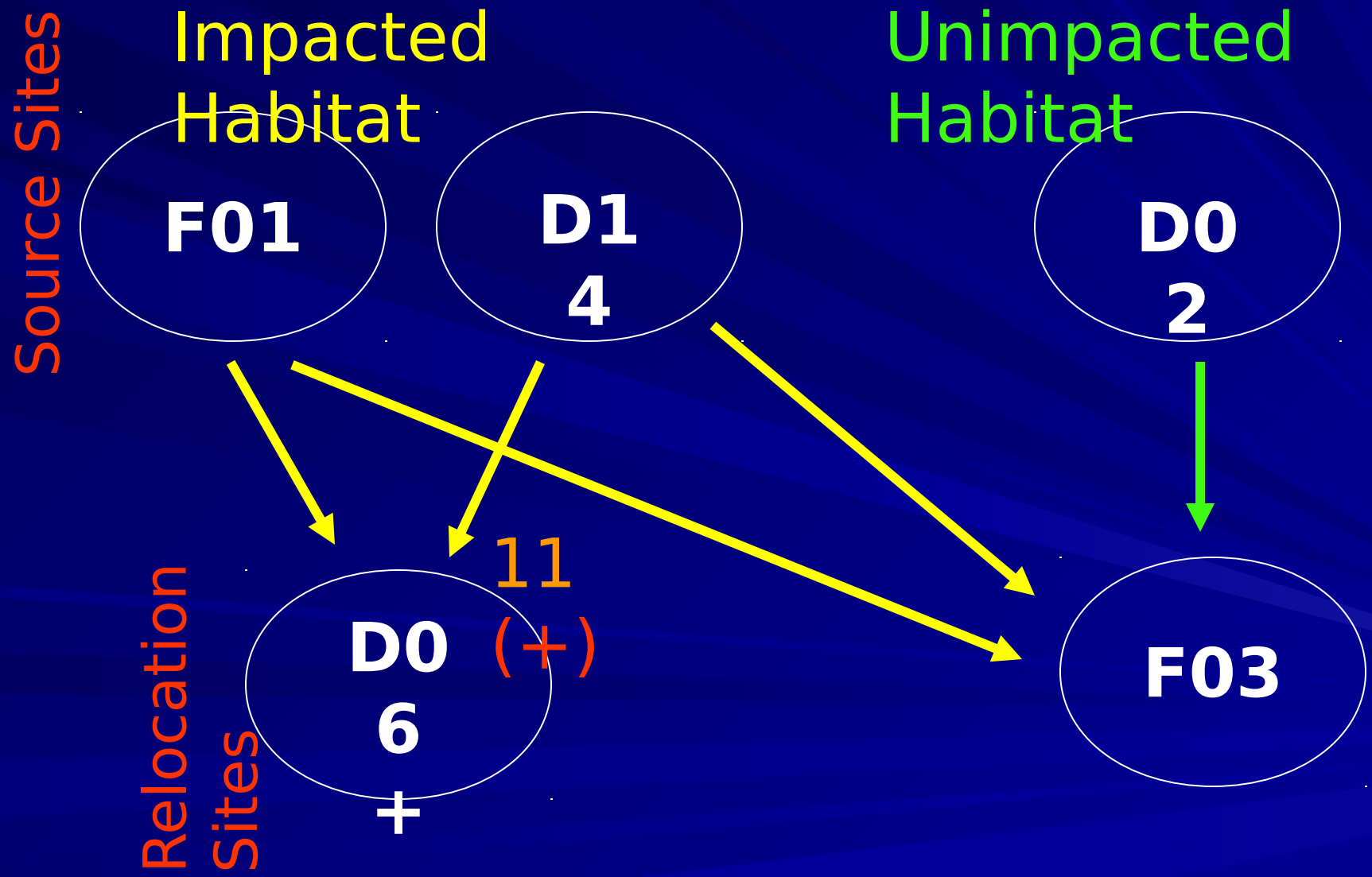
Next morning → **Return to burrow**

+20-30 days → **SRBC bleed**

Results

- Study ended Sept 30th
- Hormone and immunocompetence assays not yet completed
- Upper Respiratory Tract Disease (URTD)

Treatment Groups



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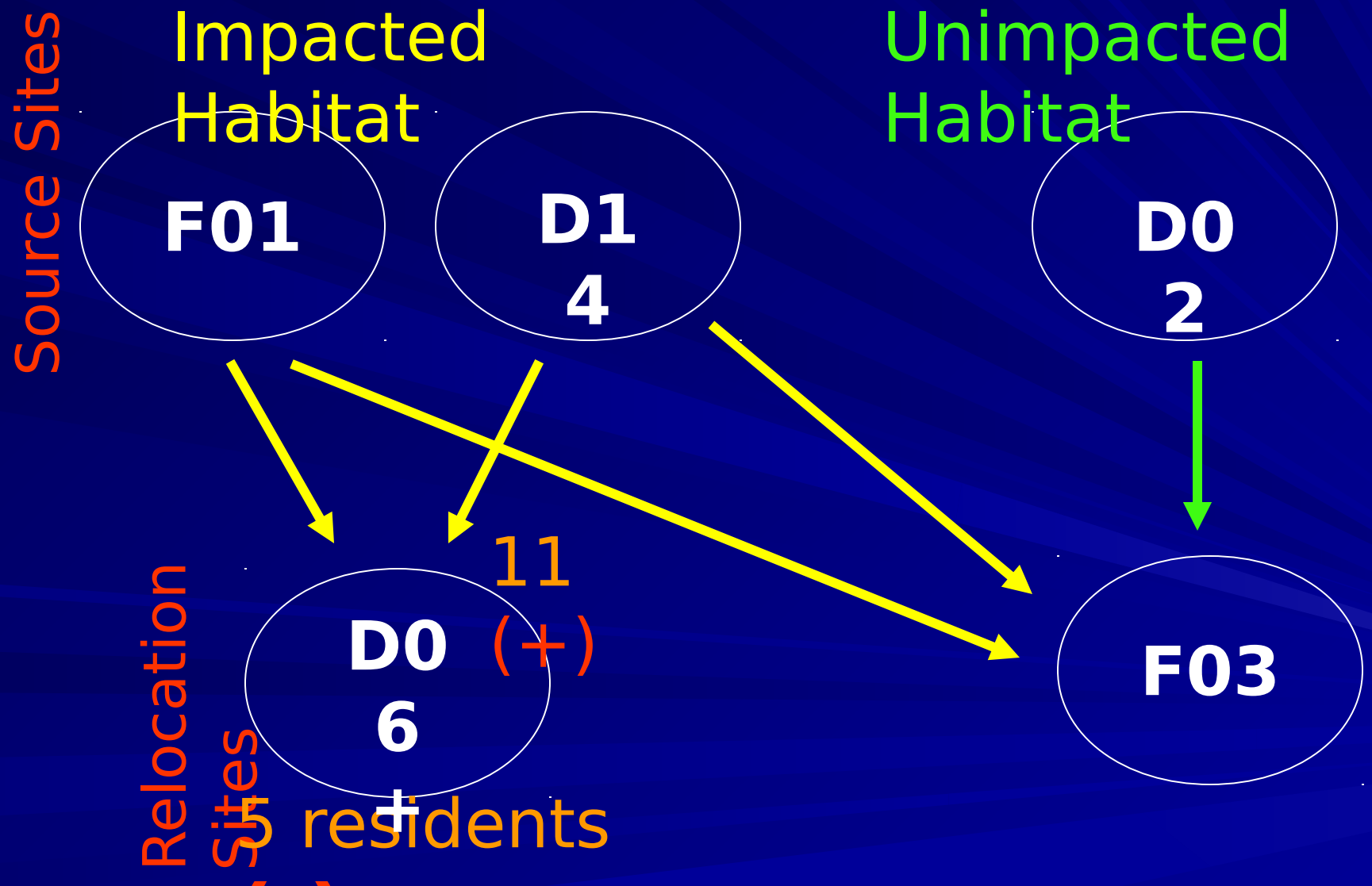

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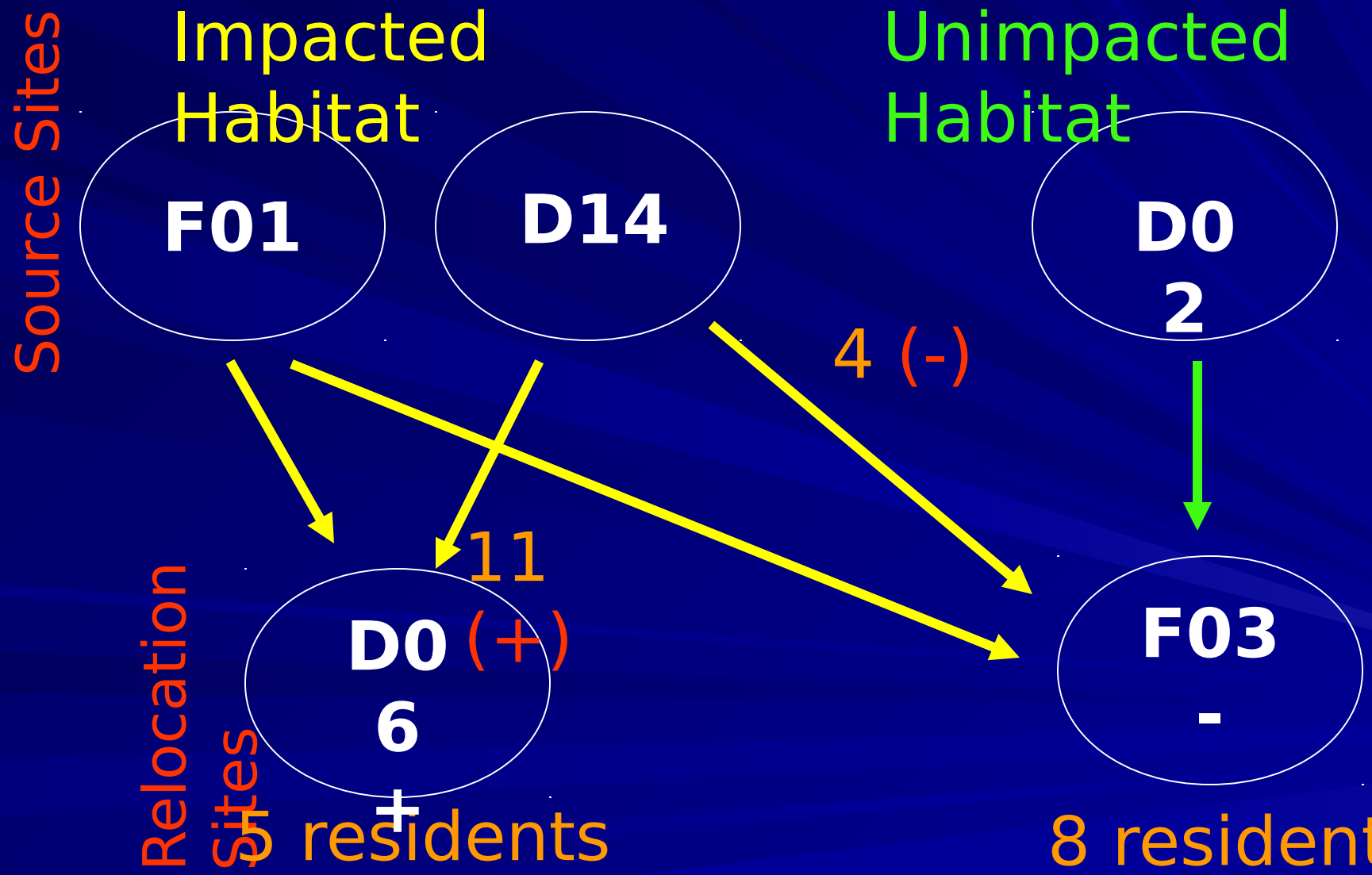

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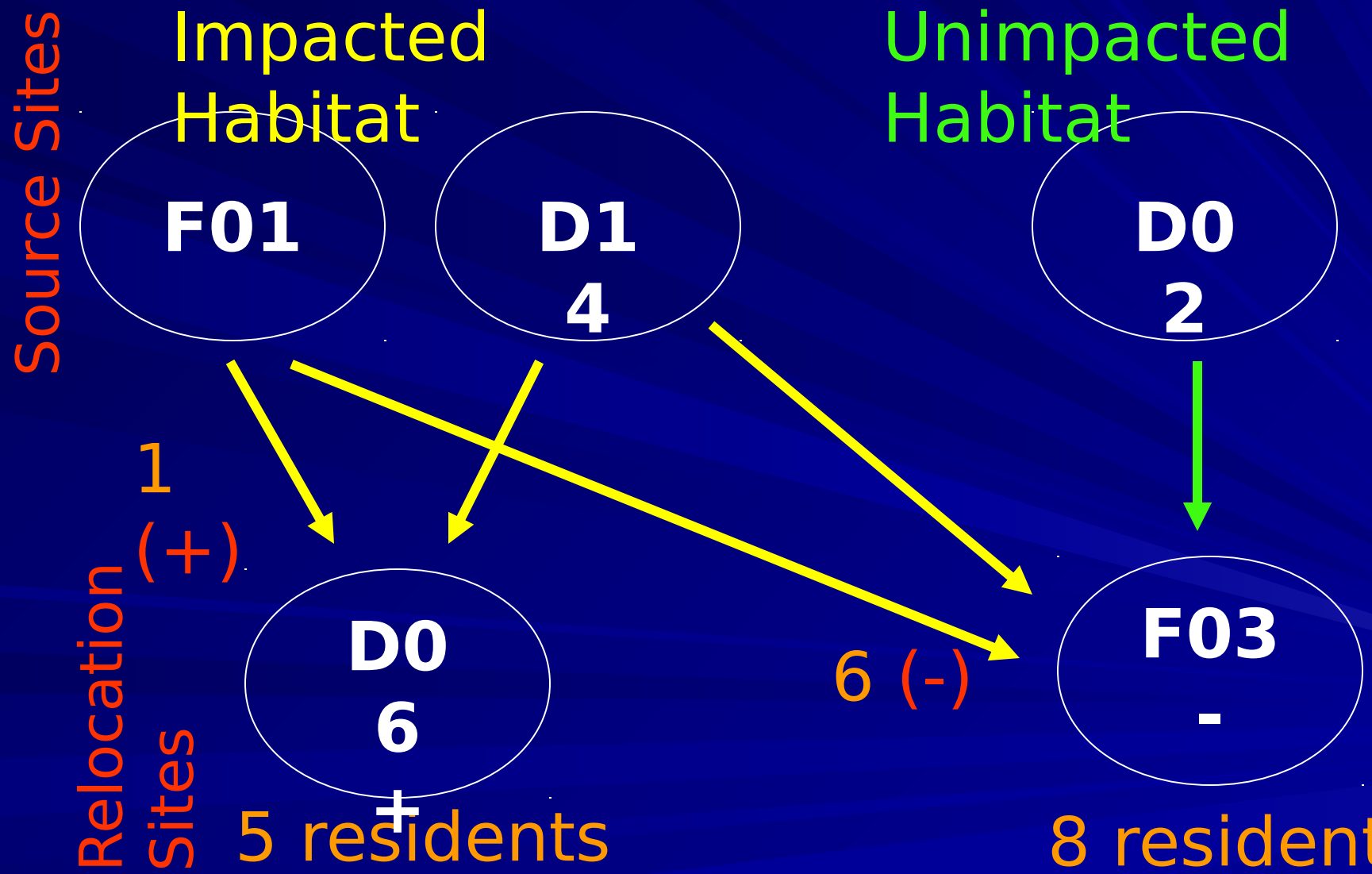

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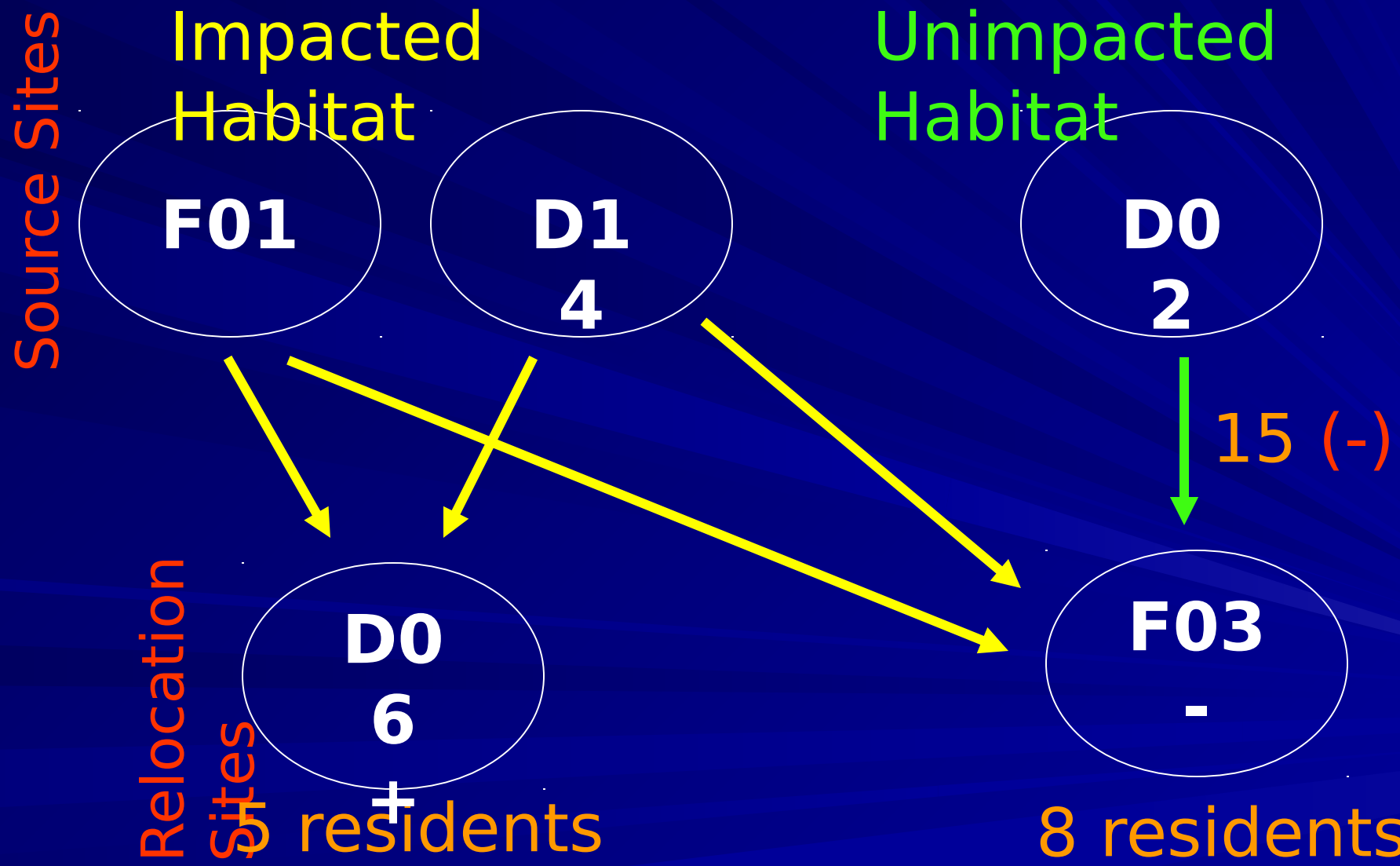

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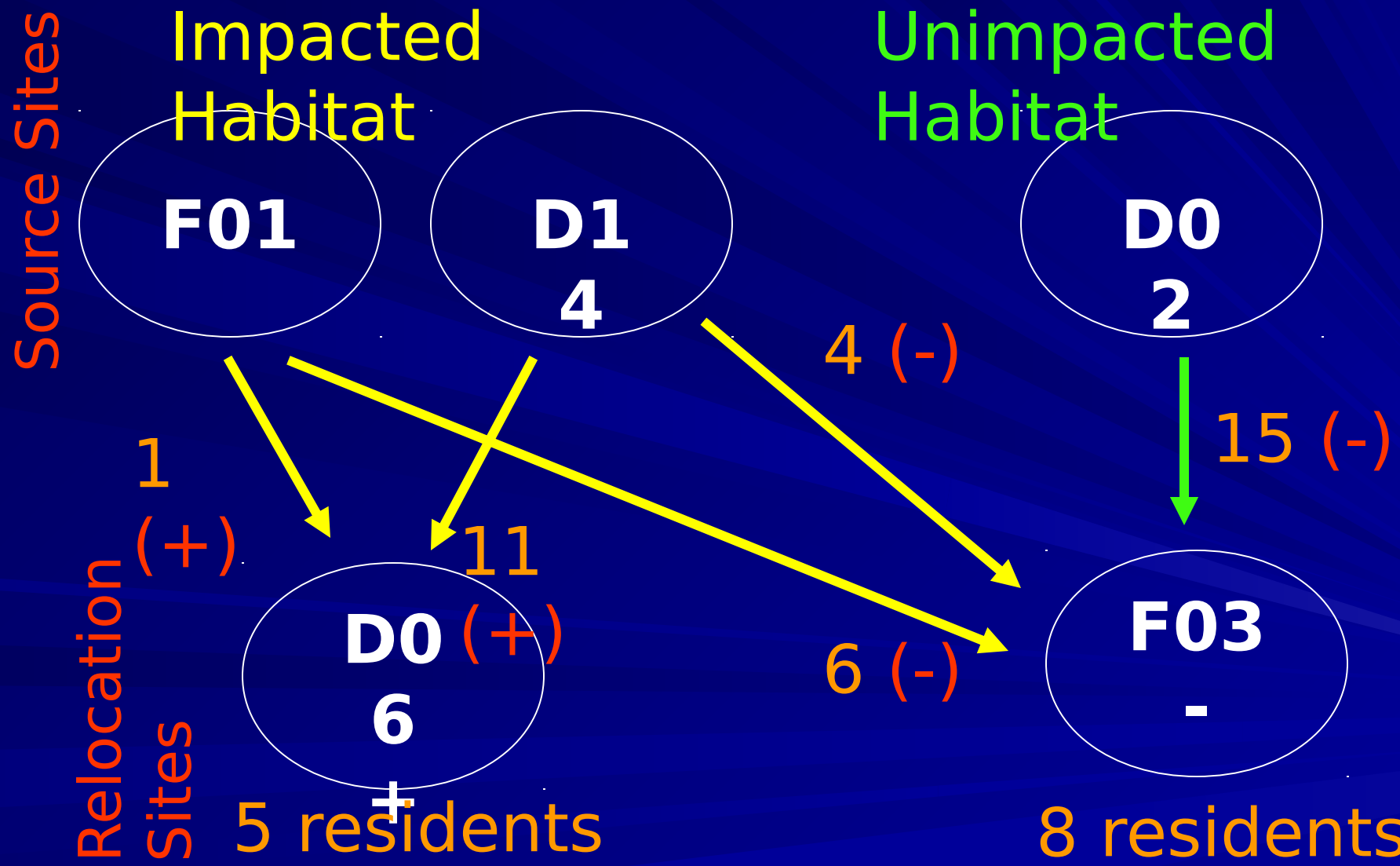

2 Gopher Tortoise Studies

- Relocation
- Burrow Collapse

Burrow Collapse Study

- Tortoise burrows are often accidentally run over during forestry practices.
- At Ft. Benning, military vehicles also run over burrows accidentally.
- Previous formal studies have not been conducted on excavation success and/or mortality resulting from burrow collapse

What are the effects of burrow collapse on Gopher tortoises?

- Excavation success
- Stress
- Immunocompetence
- Movement

Treatments

APC

10 burrows at D12

Skidder

4 burrows at D12

6 burrows at K20

Stress and Immune Challenge Timeline

Day 0 → **Capture bleed**

At Base → **Pre-Measure PHA, Inject ACTH, SRBC, and PHA**

+4 hours → **ACTH bleed**

+12 hours → **PHA measure**

Next morning → **Return to burrow**

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Results

- Excavation success of the tortoises
- Observational damage done by each vehicle
- Days until excavation
- Movement of tortoises after excavation
- Observational appearance of excavated tortoises

Excavation Success

- **Nineteen out of twenty tortoises excavated their collapsed burrow on their own!**

Preferred Customer:

Burrow 22

Former Home of tortoise one

Observations of Damage by APC

- Took several passes for APC to crush burrows
- Most of the damage caused by the APC was done to the mouth of the burrow
- Seven of the ten burrows collapsed by the APC have remained active burrows

Observations of damage done by Logging Skidder

- Burrow was thoroughly crushed by one pass of skidder
- Damage was done to the underlying structure as well as the mouth of the burrow
- Four of ten burrows have remained active burrows

Days until excavation

APC

- Tortoises took an average of four days to excavate collapsed burrows

Logging Skidder

- Tortoises took an average of nine days to excavate collapsed burrows
- One of the ten burrows collapsed was not excavated by its resident

Why do we see differences in burrow damage and excavation success when comparing the APC and the Skidder?

Armored Personnel Carrier

The APC weighs 24,000 pounds

By distributing its weight on its two tracks, the APC exerts less pressure per square inch than the skidder

Lower PSI less damage to burrow

Logging Skidder

- The logging skidder weighs 47,500 pounds (unloaded)
- The skidder distributes its weight on four tires giving each tire a greater pressure per square inch
- Higher PSI greater the damage to the burrow

Movement of excavated tortoises

- All tortoises that remained within a normal home range of their collapsed burrow
- Only three of the twenty tortoises moved to a burrow that they had not been previously tracked to
- Very little change in r
patterns occurred afte

Observational appearance of Collapsed Tortoises

- No tortoise has had any life-threatening injury from collapse
- No post collapse tortoises had broken shells or limbs
- Stress levels and Immunocompetence will be determined after analysis of lab work and immune challenges

Gopherus polyphemus

Acknowledgements

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